

What Can Continuous Monitoring Tell Use About Hurricanes?

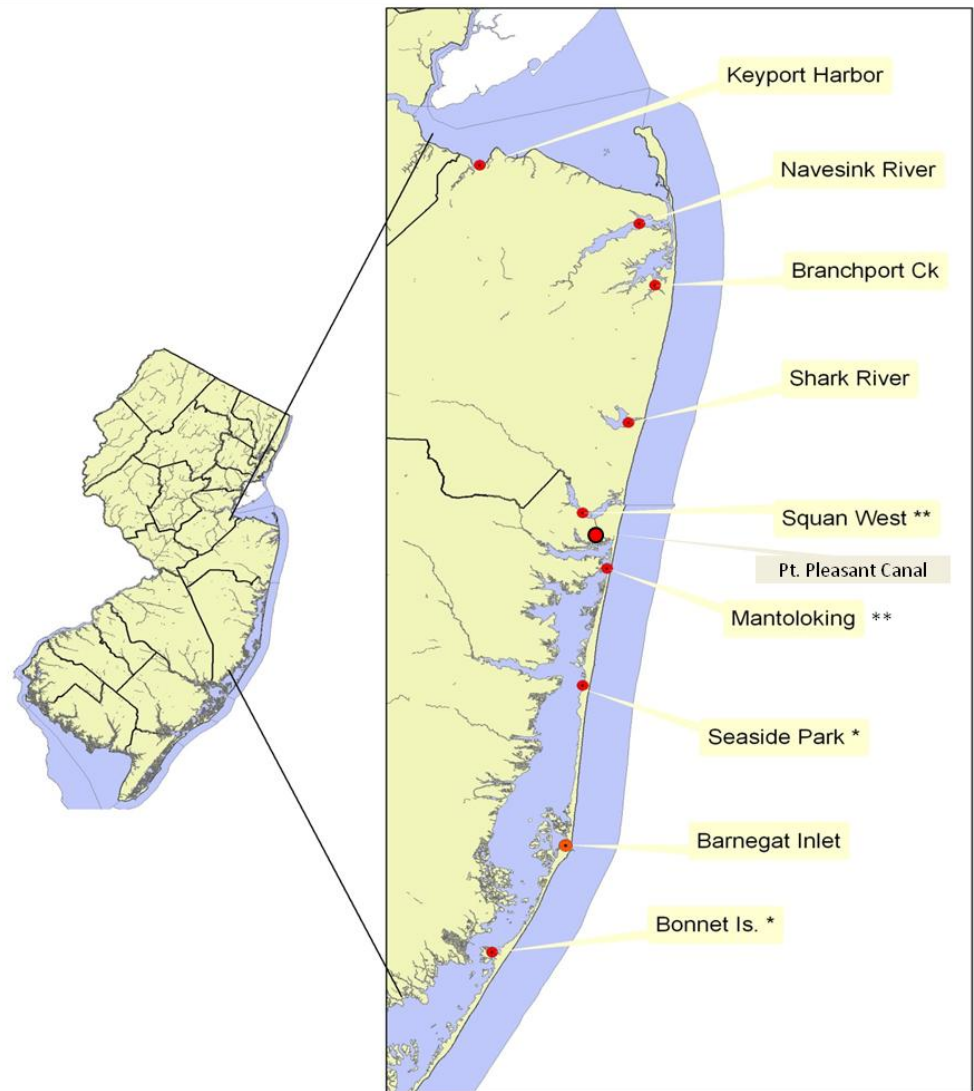
Irene and Sandy in Barnegat Bay

**NJ Water Monitoring Council
And Barnegat Bay Partnership
Joint Technical Meeting
On Barnegat Bay**

**James Nickels
Urban Coast Institute
Monmouth University**

February 6, 2013

Real Time Water Quality Monitoring in New Jersey Estuaries



Monmouth University Water Quality Monitoring Stations

* Owned by Barnegat Bay National Estuary Program
Operated by Monmouth University

** Removed

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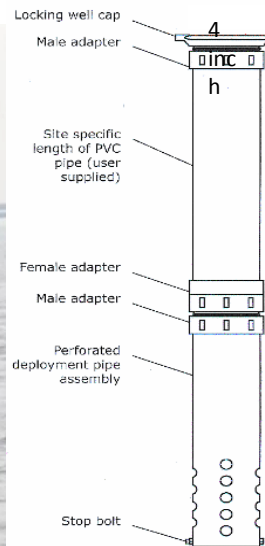
WHERE LEADERS LOOK *forward*



Solar Panel

Control Box

Typical installation: Solar panel and cellular antenna on top, control box housing data logger, cellular modem and backup battery. Cable then feeds data probe (sonde) which is housed in PVC pipe attached to a piling or fender system.



Real Time Water Quality Monitoring in New Jersey Estuaries

Data Collection

Readings are taken every 15 minutes and
transmitted once per hour to Monmouth

Parameters include:

- Temperature
- Conductivity
- Salinity
- pH
- Dissolved Oxygen
- Chlorophyll
- Turbidity
- Depth

www.monmouth.edu/uci/cwq



Sandy

Oct 29th 8 p.m.: Sandy's center comes ashore near Atlantic City, New Jersey. The storm is no longer considered a hurricane but is now classified as a post-tropical nor'easter

NY Harbor surge nearly 14 feet — is a new record for a storm surge in the harbor. The previous record of just over 10 feet was set in 1960 when Hurricane Donna passed just offshore.

Rainfall from Sandy was not the dominant cause of flooding in coastal New Jersey approx 2-4 inches



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Point Pleasant Canal

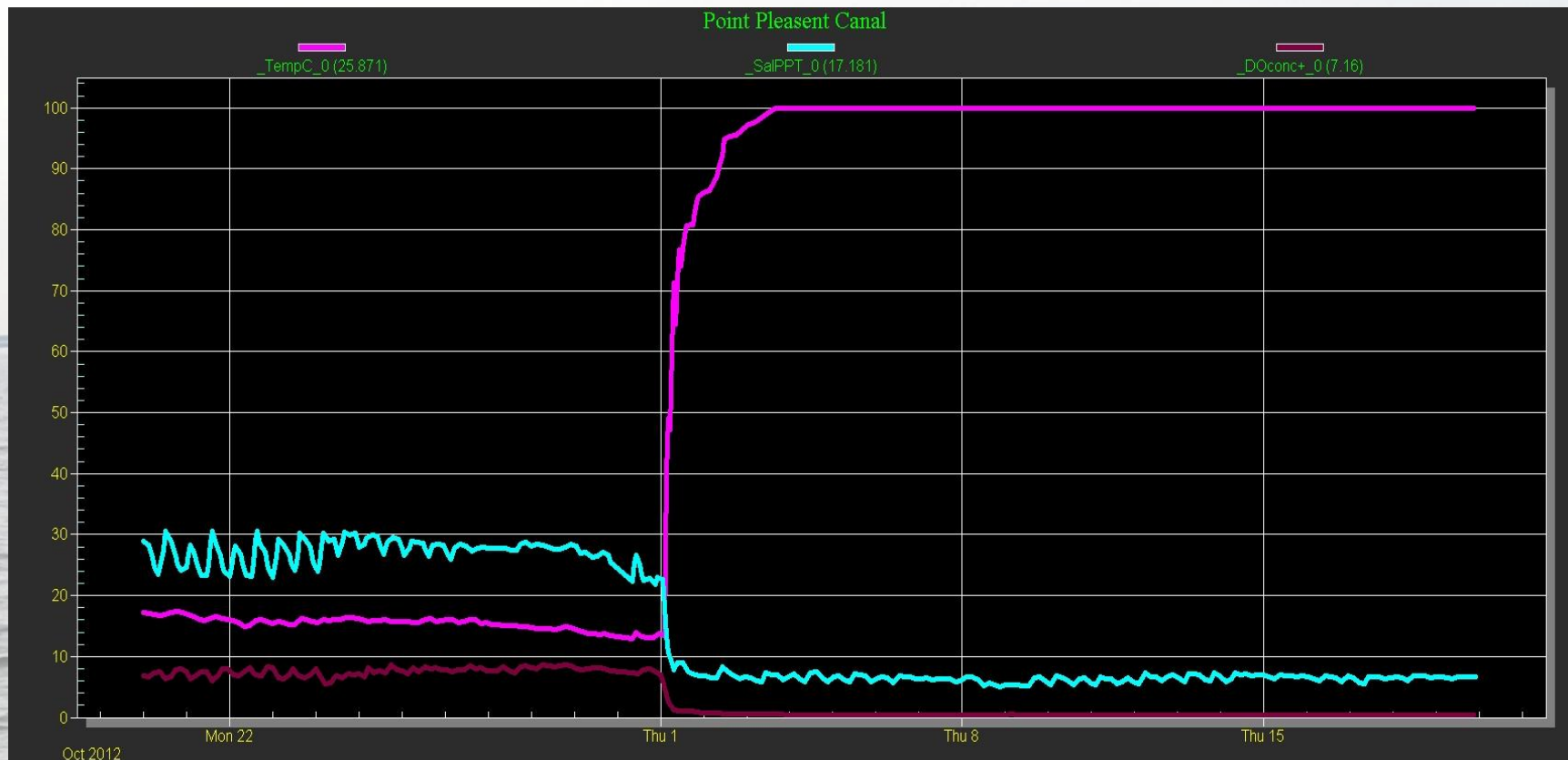


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Point Pleasant Canal

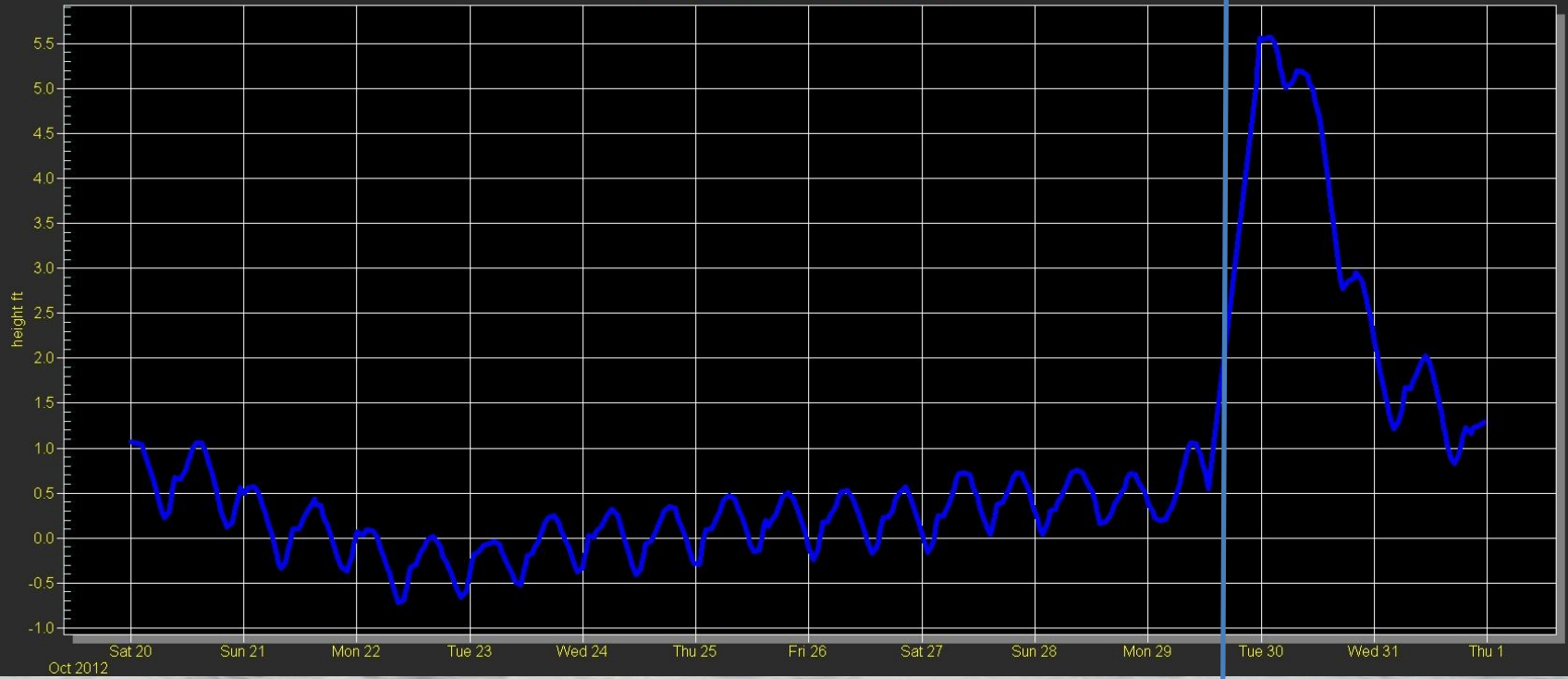


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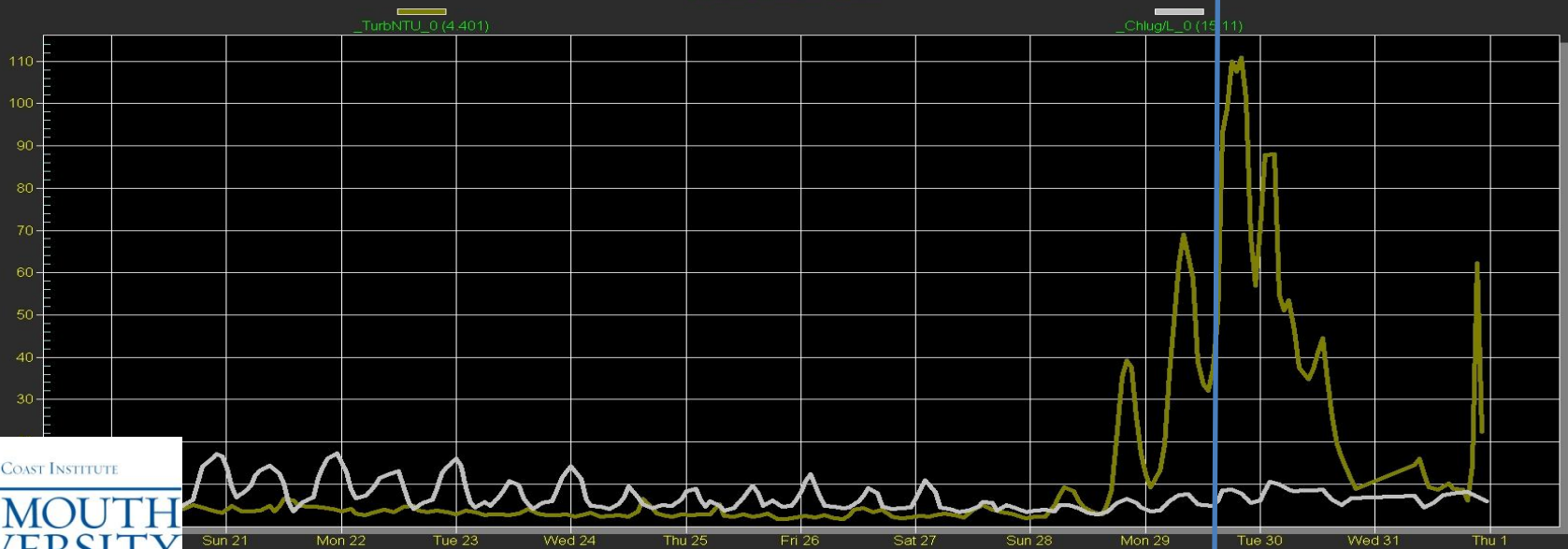
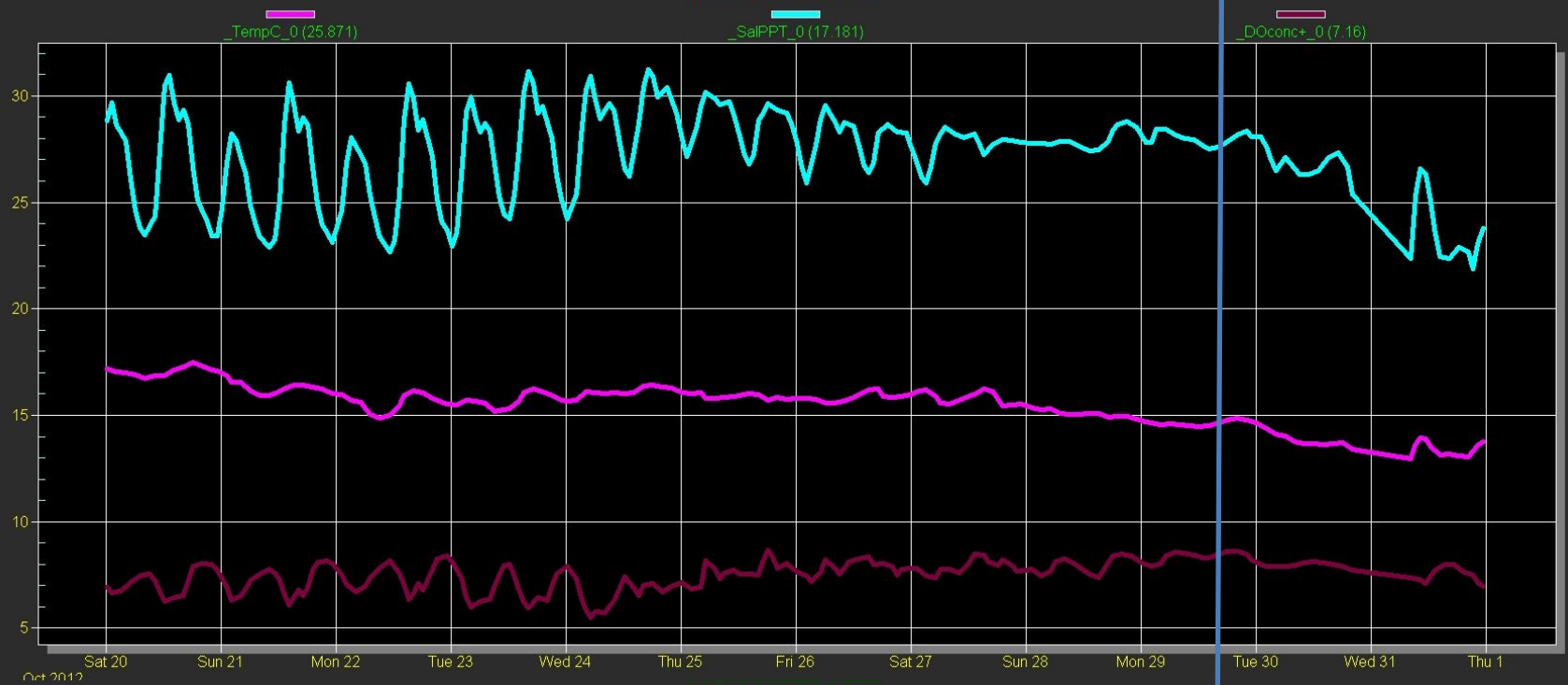
Point Pleasant Canal USGS Data



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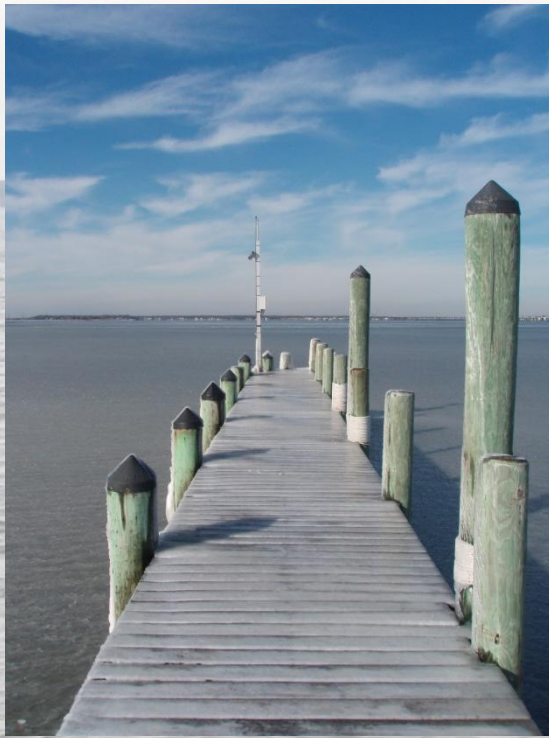
Point Pleasant Canal



Statistics Pt. Pleasant Canal

	Mean	Minimum	Maximum	Avg Deviation	Std Deviation	Valid Samples	%
_TempC_0 (25.871)	15.52	12.96	17.49	0.76	0.98	277	25.00
_SalPPT_0 (17.181)	27.26	21.85	31.21	1.65	2.10	277	25.00
_pH_0 (7.791)	7.69	7.37	7.83	0.06	0.08	277	25.00
_TurbNTU_0 (4.401)	12.04	1.42	110.78	13.20	20.84	276	24.91
_Chlug/L_0 (15.11)	7.26	2.69	17.20	2.65	3.32	277	25.00
_DO%+_0 (97.0001)	89.34	67.88	104.35	6.06	7.49	277	25.00
_DOconc+_0 (7.16)	7.55	5.53	8.67	0.56	0.69	277	25.00

Seaside Park Sandy

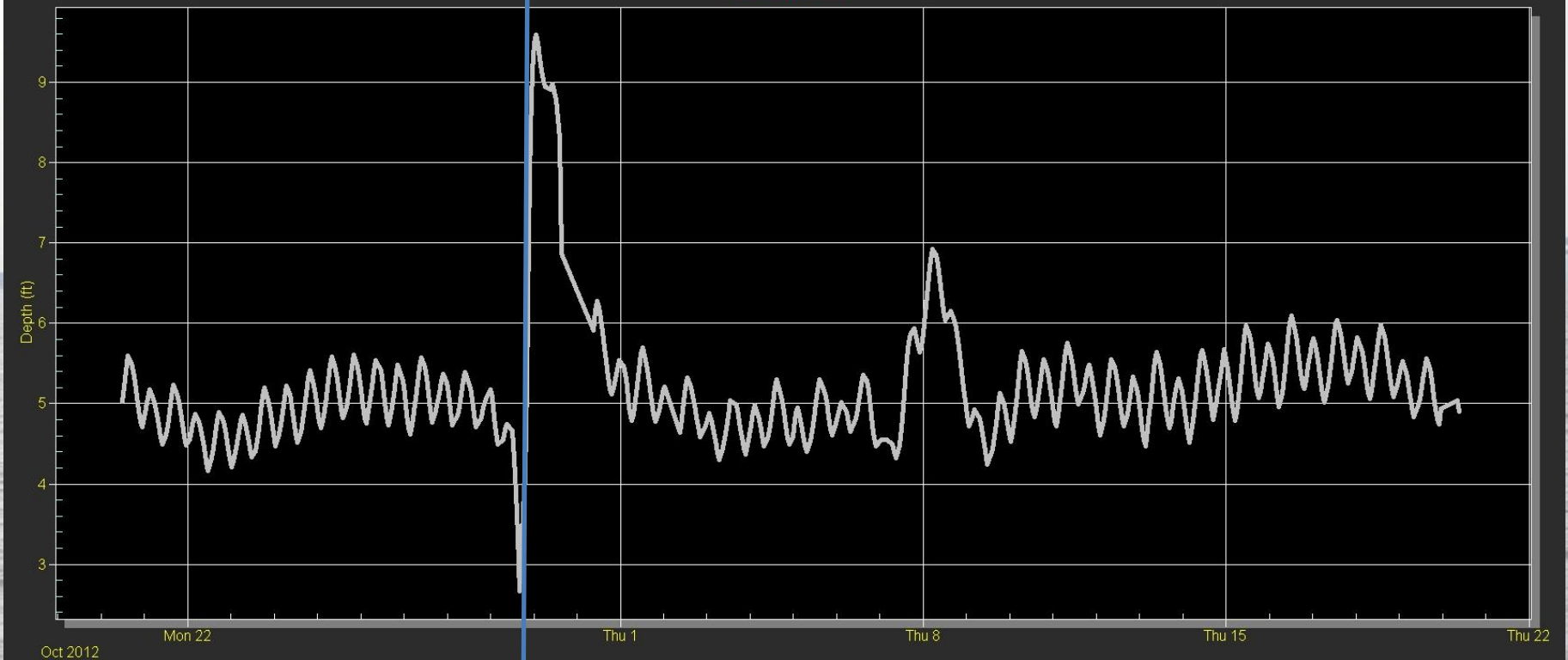


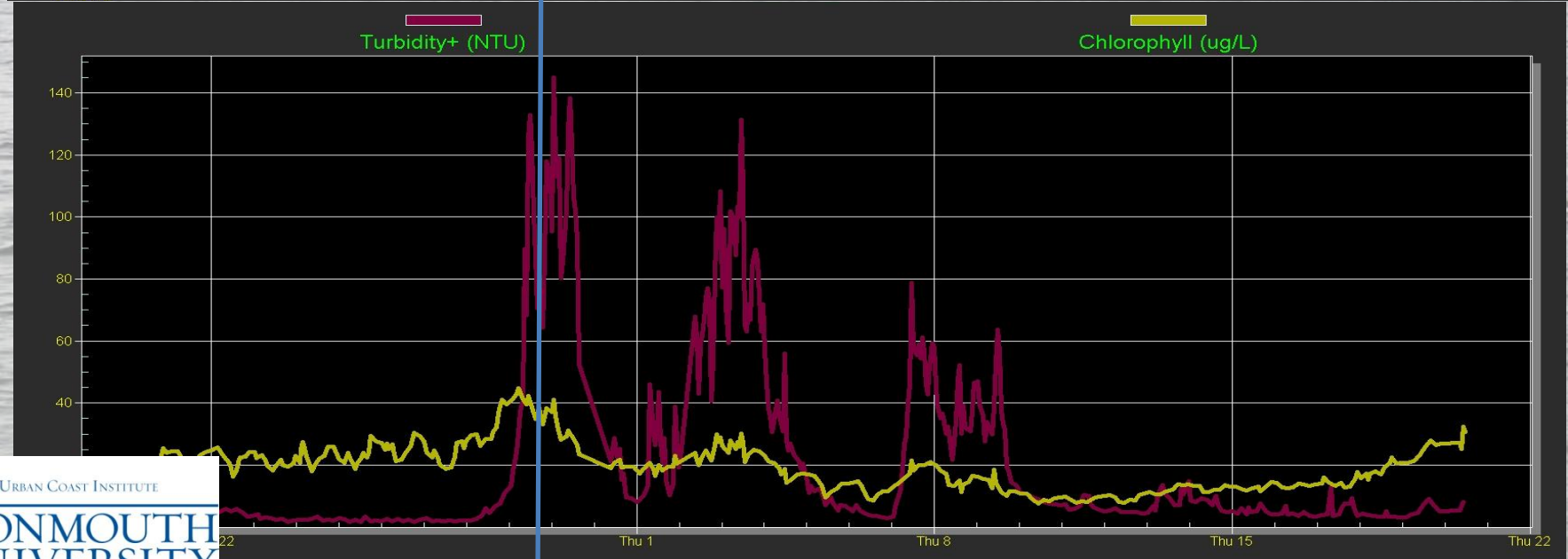
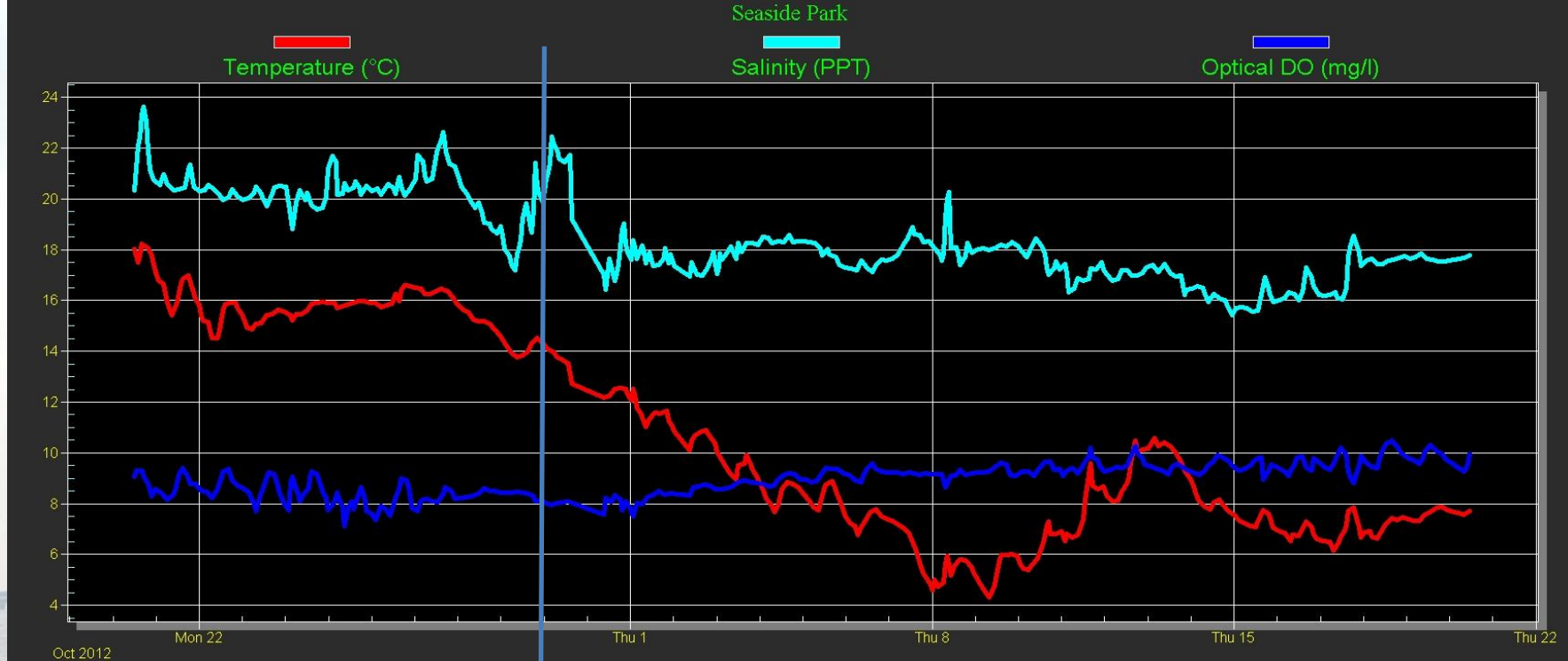
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Seaside Park





Statistics Seaside Park

YSI SDI-12 Sonde 0	Mean	Minimum	Maximum	Avg Deviation	Std Deviation	Valid Samples	%
Temperature (°C)	10.59	4.33	18.31	3.58	3.96	705	25.01
Salinity (PPT)	18.43	15.42	23.62	1.38	1.66	705	25.01
Depth (ft)	5.187	2.666	9.591	0.472	0.773	705	25.01
pH (pH)	7.87	7.64	8.09	0.07	0.09	705	25.01
Turbidity+ (NTU)	18.39	1.63	144.90	19.44	27.49	705	25.01
Chlorophyll (ug/L)	19.1	6.9	45.2	6.0	7.5	705	25.01
Optical DO (%)	90.124	78.200	113.450	5.034	6.367	705	25.01
Optical DO (mg/l)	8.955	7.128	10.462	0.536	0.640	705	25.01

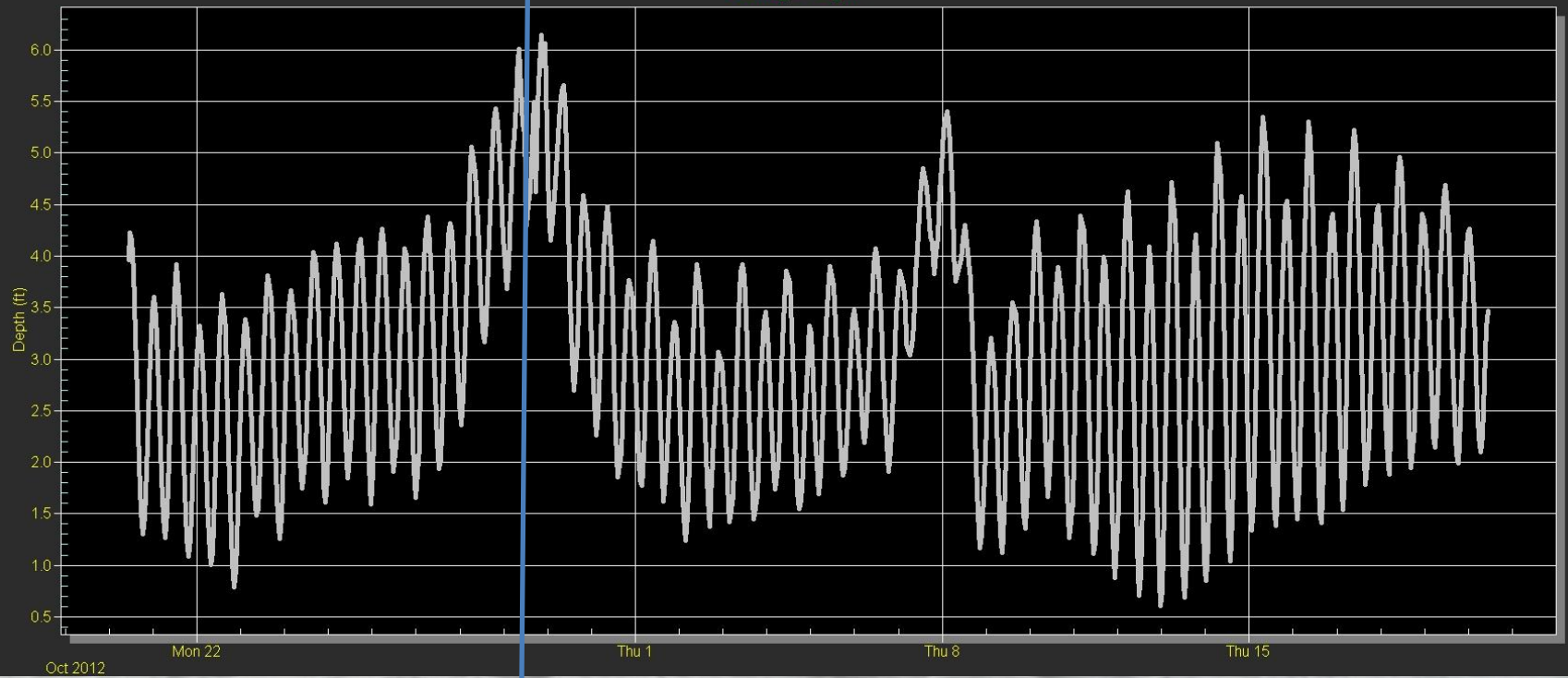
Barnegat Light



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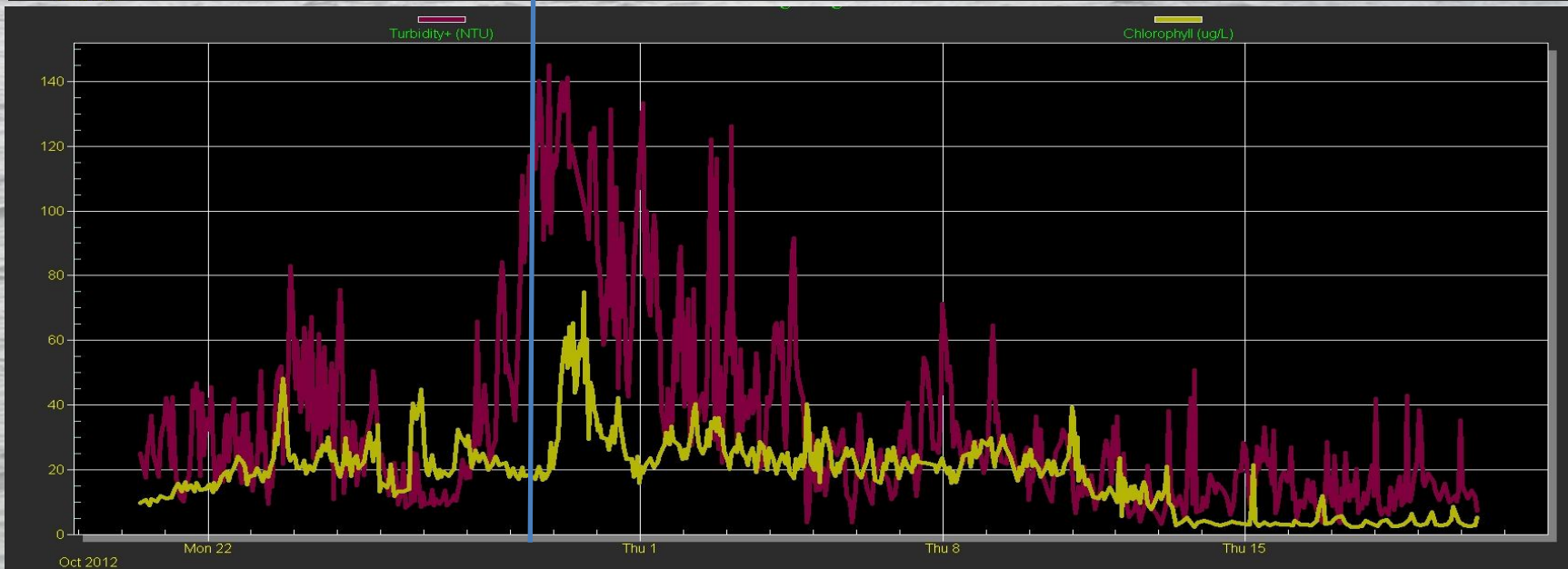
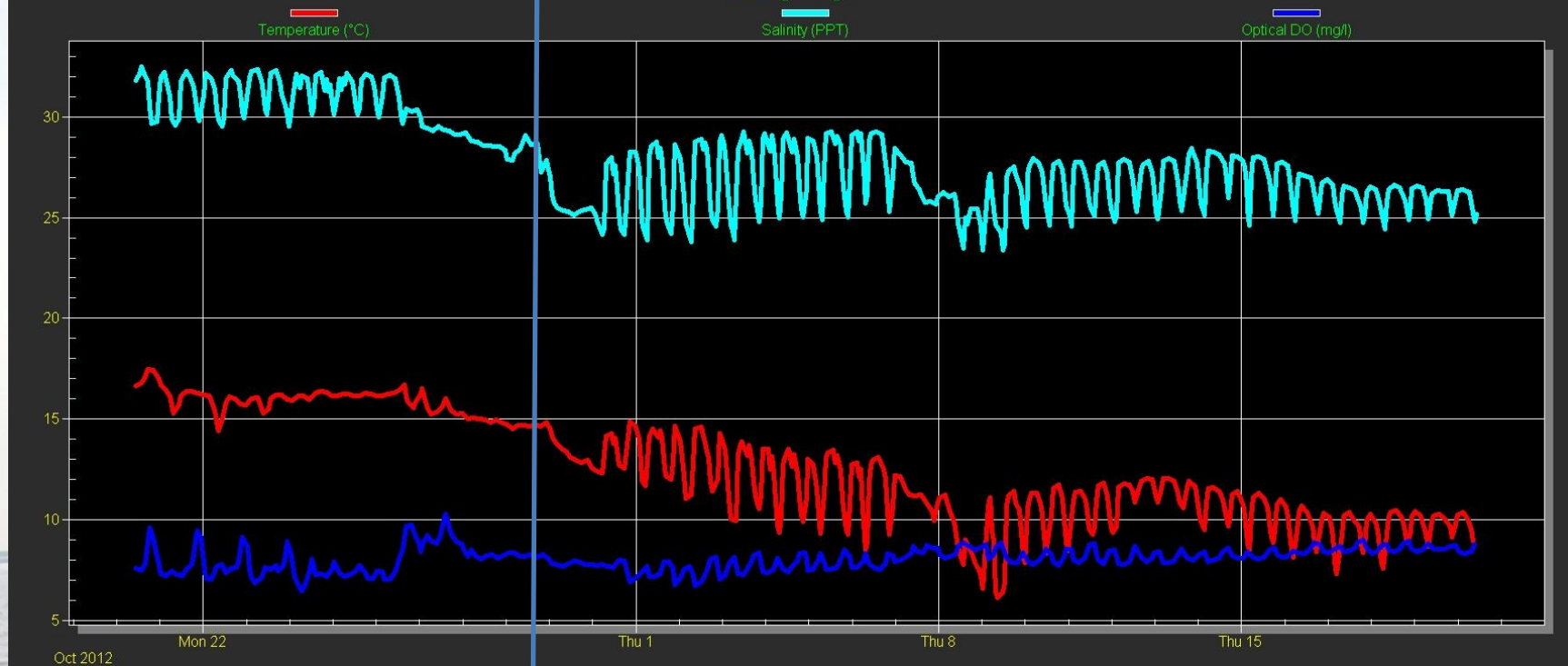
Barnegat Light



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Barnegat Light



Statistics Barnegat Light

YSI SDI-12 Sonde 0	Mean	Minimum	Maximum	Avg Deviation	Std Deviation	Valid Samples	%
Temperature (°C)	12.56	6.11	17.68	2.32	2.67	745	25.03
Salinity (PPT)	27.87	23.22	32.47	1.85	2.27	745	25.03
Depth (ft)	3.100	0.608	6.143	0.950	1.137	745	25.03
pH (pH)	7.71	7.48	7.96	0.05	0.07	745	25.03
Turbidity+ (NTU)	32.12	2.25	144.90	19.99	27.70	729	24.49
Chlorophyll (ug/L)	18.4	1.9	74.9	8.5	11.1	745	25.03
Optical DO (%)	90.048	78.975	124.600	4.709	7.008	745	25.03
Optical DO (mg/l)	8.061	6.445	10.288	0.470	0.590	745	25.03

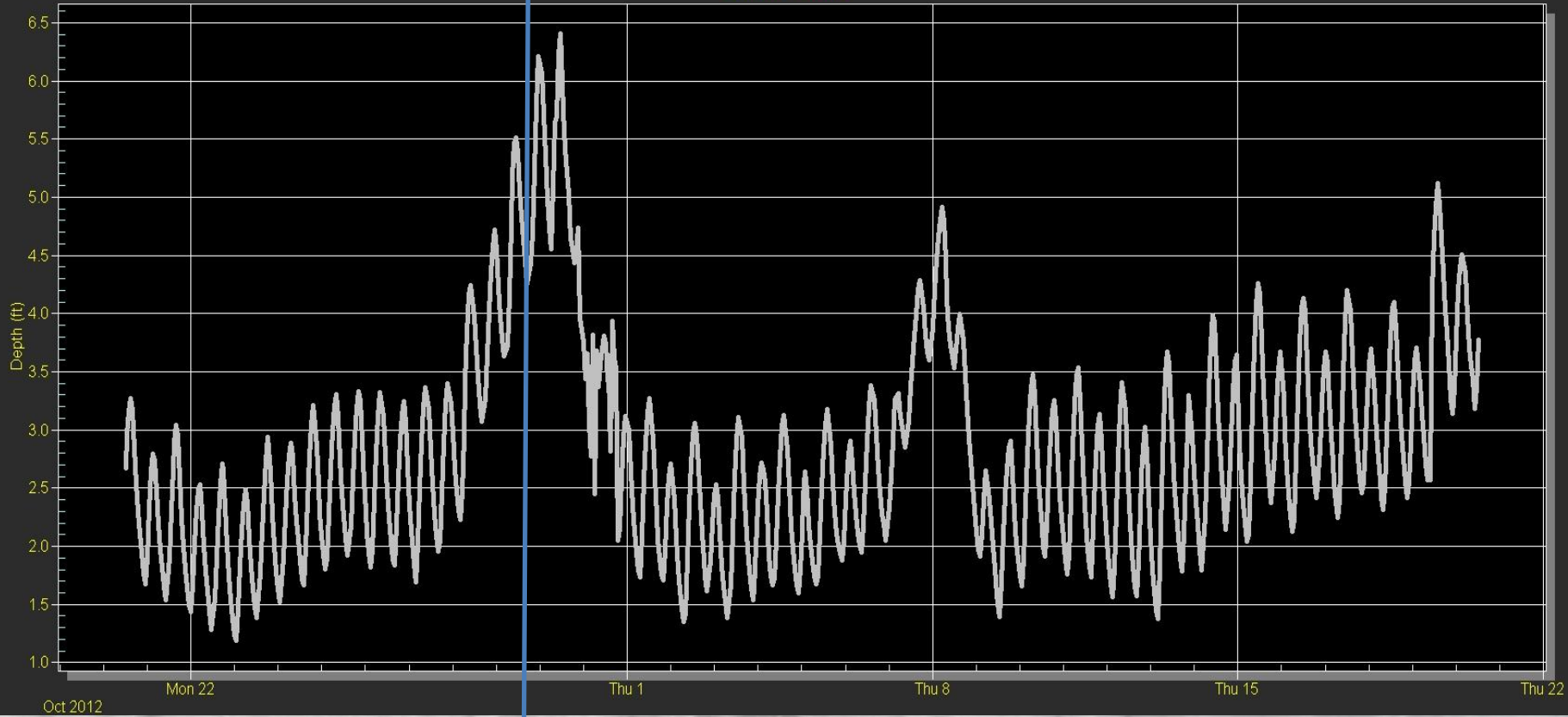
Bonnet island



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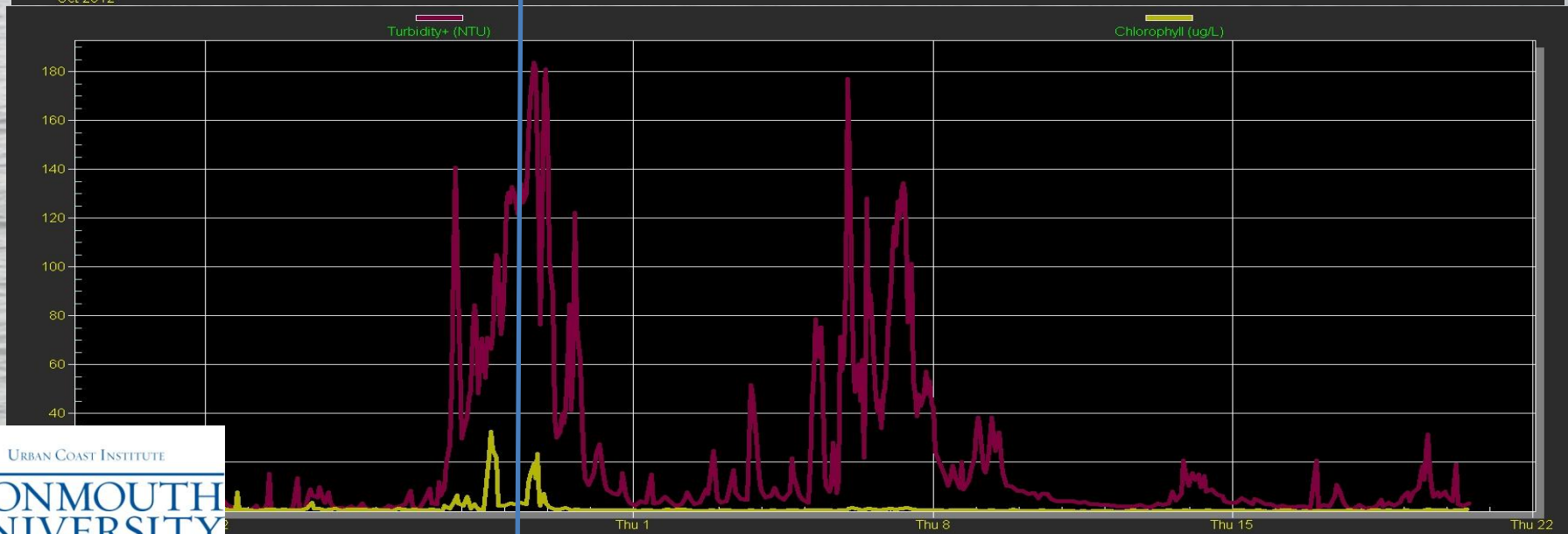
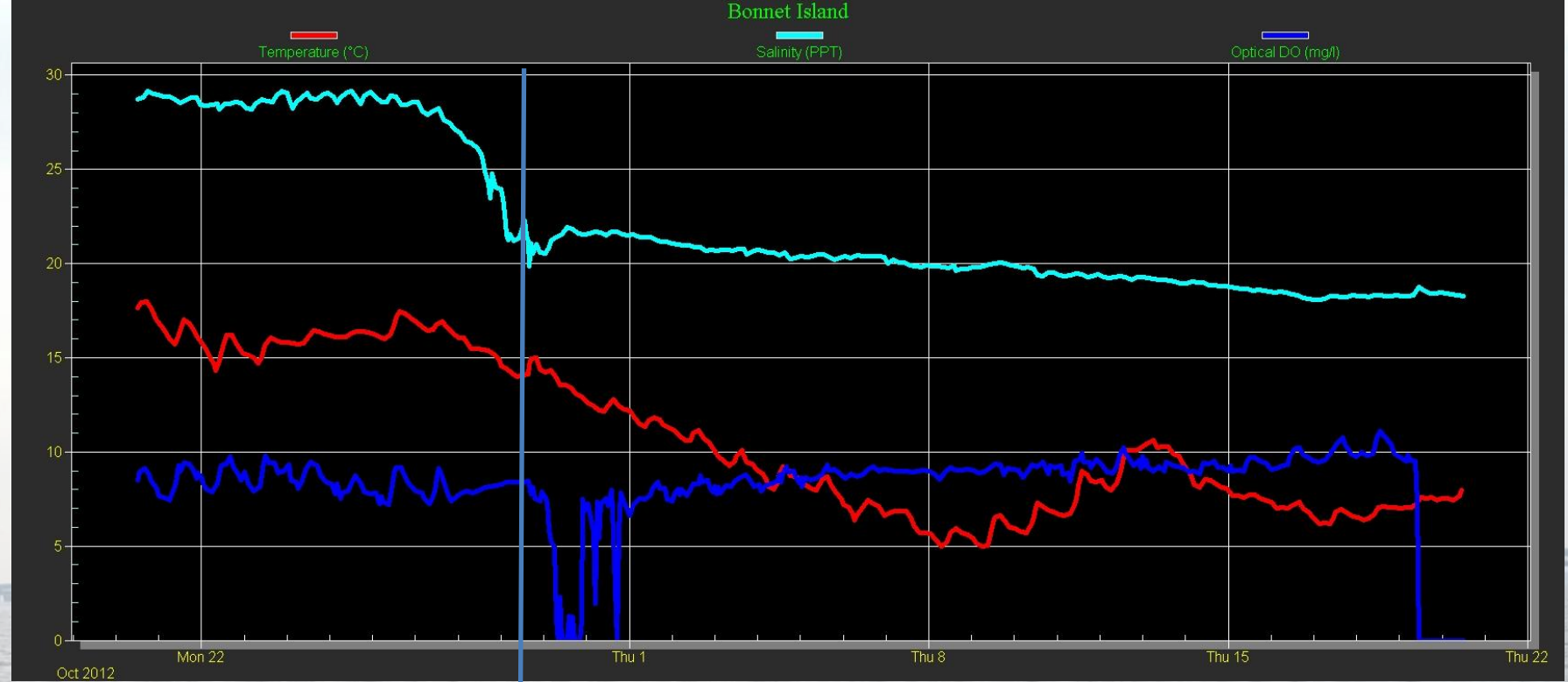
Bonnet Island



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Statistics Bonnet Island

YSI SDI-12 Sonde 0	Mean	Minimum	Maximum	Avg Deviation	Std Deviation	Valid Samples	%
Temperature (°C)	10.72	4.72	18.02	3.58	3.97	745	25.03
Salinity (PPT)	22.12	18.04	29.21	3.37	3.93	745	25.03
Depth (ft)	2.845	1.192	6.404	0.738	0.941	745	25.03
pH (pH)	7.70	7.38	9.22	0.24	0.29	745	25.03
Turbidity+ (NTU)	19.67	0.10	183.80	23.03	34.10	742	24.92
Chlorophyll (ug/L)	0.9	0.0	32.6	0.9	2.7	738	24.79
Optical DO (%)	85.262	0.000	118.025	12.453	22.781	745	25.03
Optical DO (mg/l)	8.230	0.000	11.217	1.227	2.157	745	25.03

Irene

1st Major Hurricane to hit NJ
since 1903
(actually Tropical storm at
impact near Little Egg Inlet)



Second landfall near Little
Egg Inlet, New Jersey, at
around 5:30 a.m. Sunday
Aug 28, with winds an
estimated at 75 mph.

Major Rain Producer over 11 inches In addition to major flooding,
the combination of already heavily saturated ground from a wet
summer, and heavy wind gusts made New Jersey especially
vulnerable to wind damage

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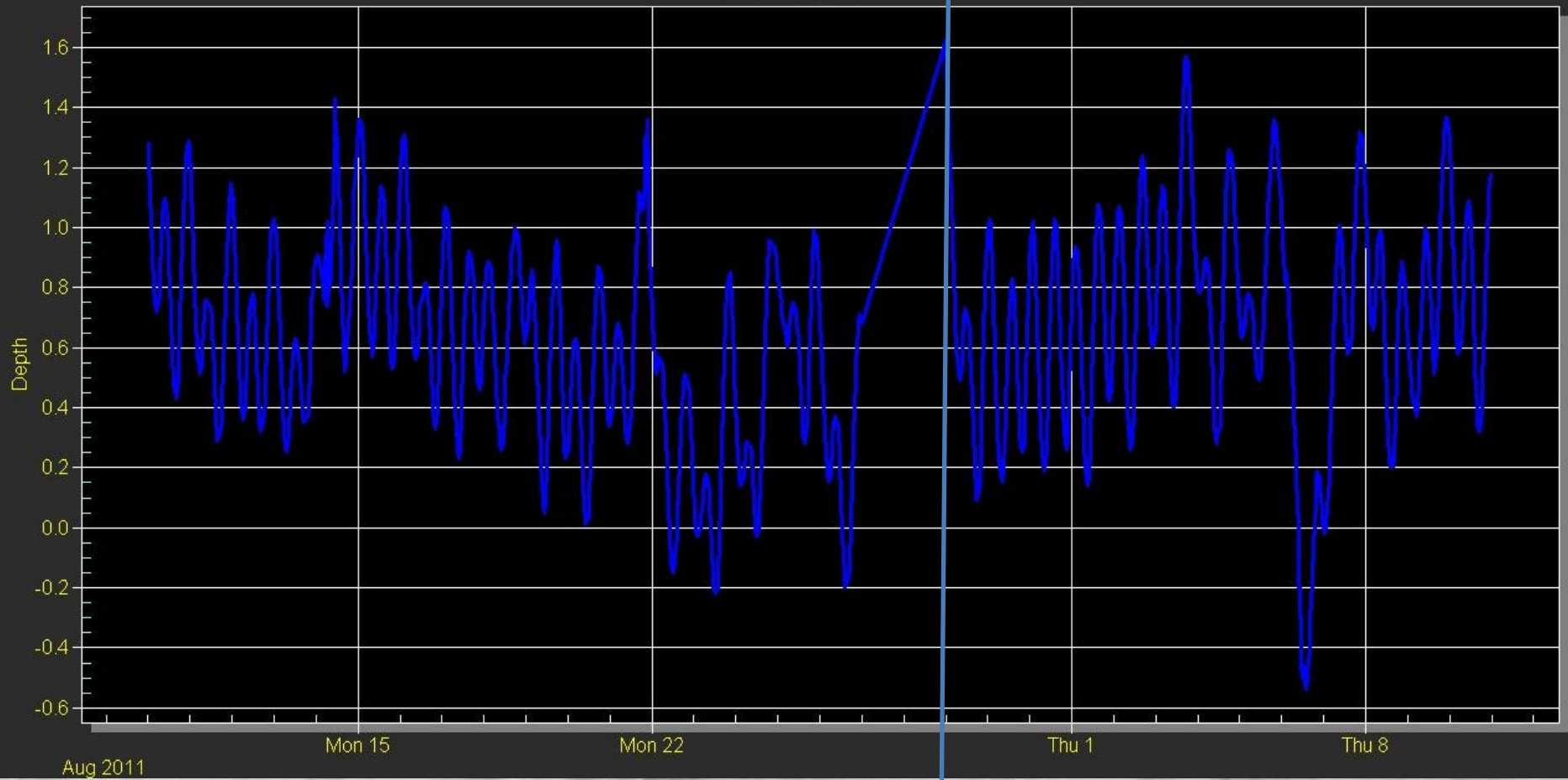
Mantoloking



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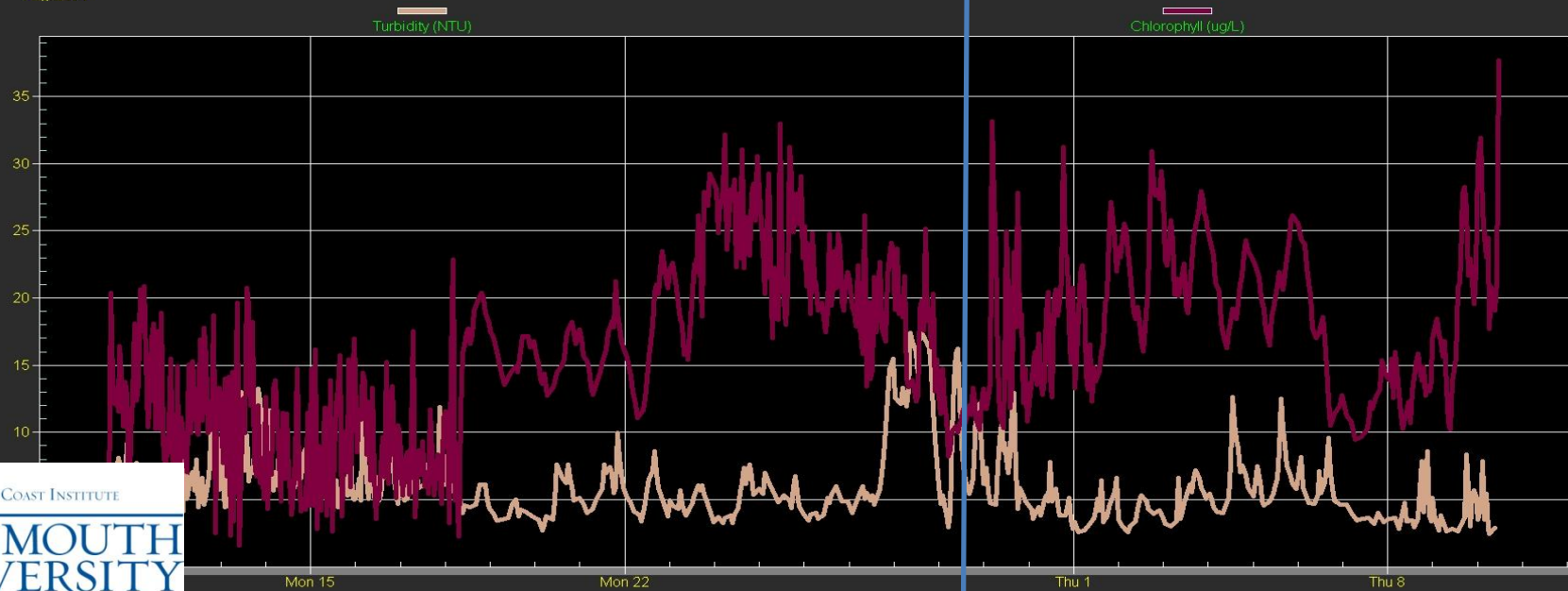
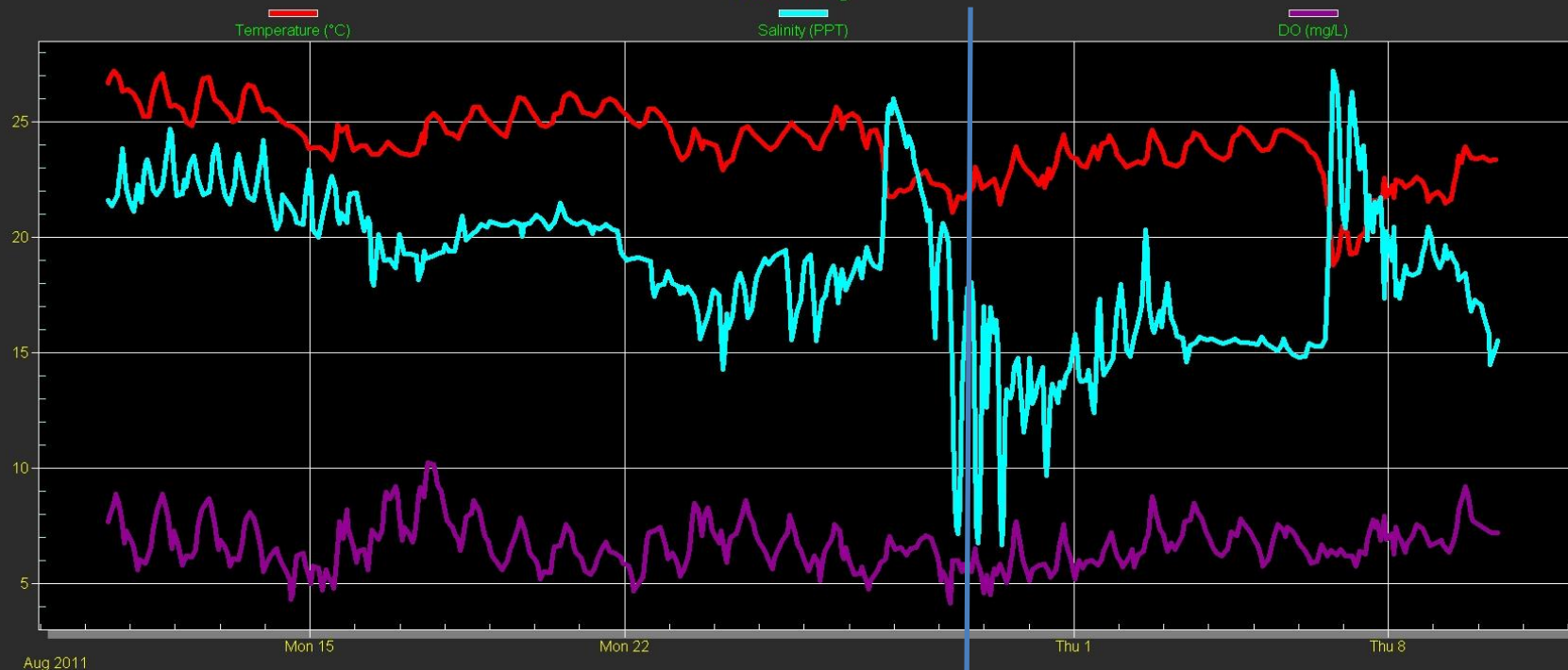
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Mantoloking USGS



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Mantoloking



Statistics Mantoloking

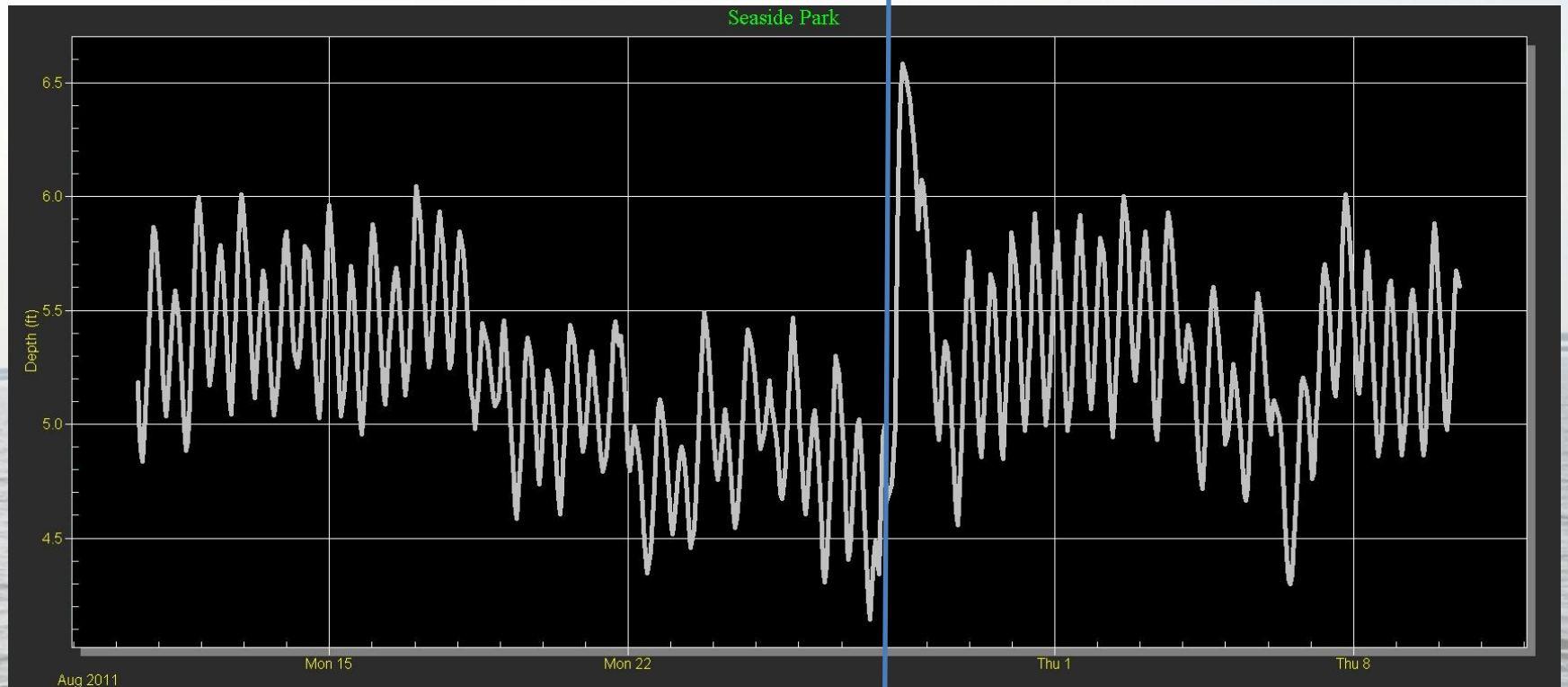
YSI SDI-12 Sonde 0	Mean	Minimum	Maximum	Avg Deviation	Std Deviation	Valid Samples	%
Temperature (°C)	24.00	18.81	27.31	1.15	1.48	738	25.01
Specific Cond (mS/cm)	30.042	11.687	42.428	3.846	4.831	738	25.01
Salinity (PPT)	18.65	6.68	27.33	2.61	3.27	738	25.01
pH (pH)	7.55	6.70	8.05	0.19	0.25	738	25.01
Turbidity (NTU)	5.82	2.48	17.78	1.81	2.56	735	24.91
Chlorophyll (ug/L)	16.5	1.6	37.7	5.1	6.3	737	24.97
DO (%)	88.9	53.8	140.3	11.2	14.3	738	25.01
DO (mg/L)	6.71	4.20	10.36	0.79	0.99	738	25.01

Seaside Park Sandy

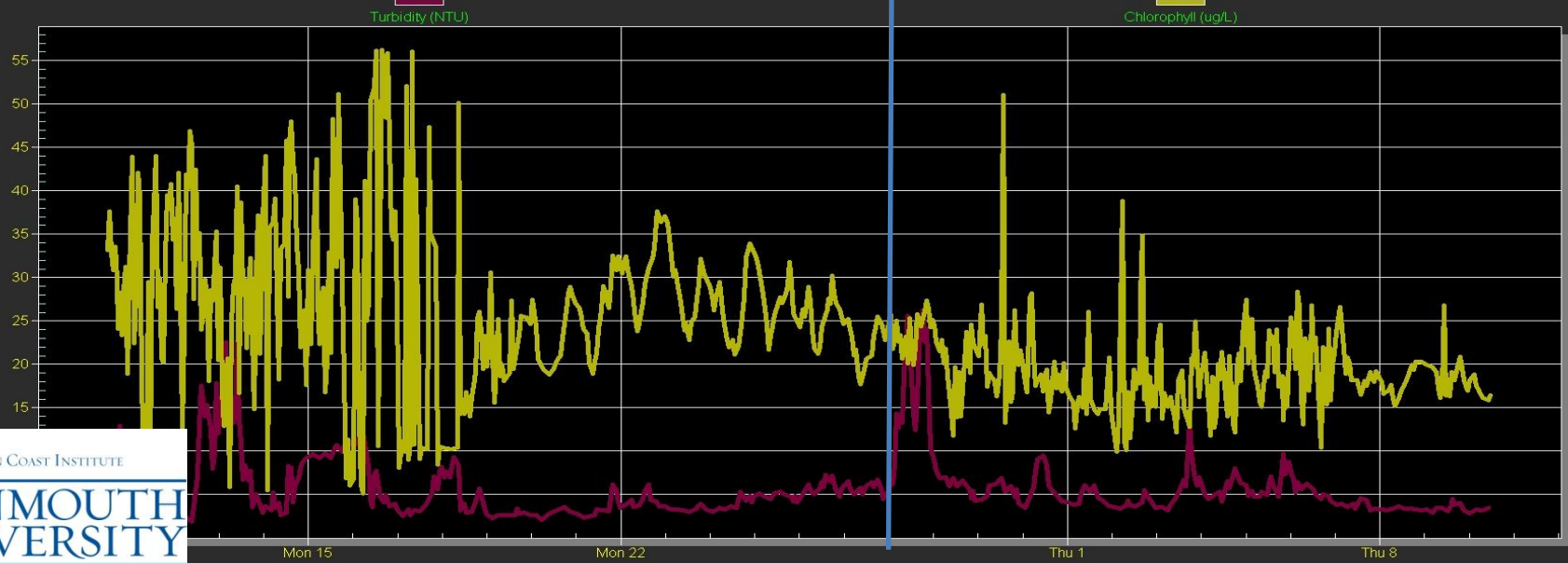
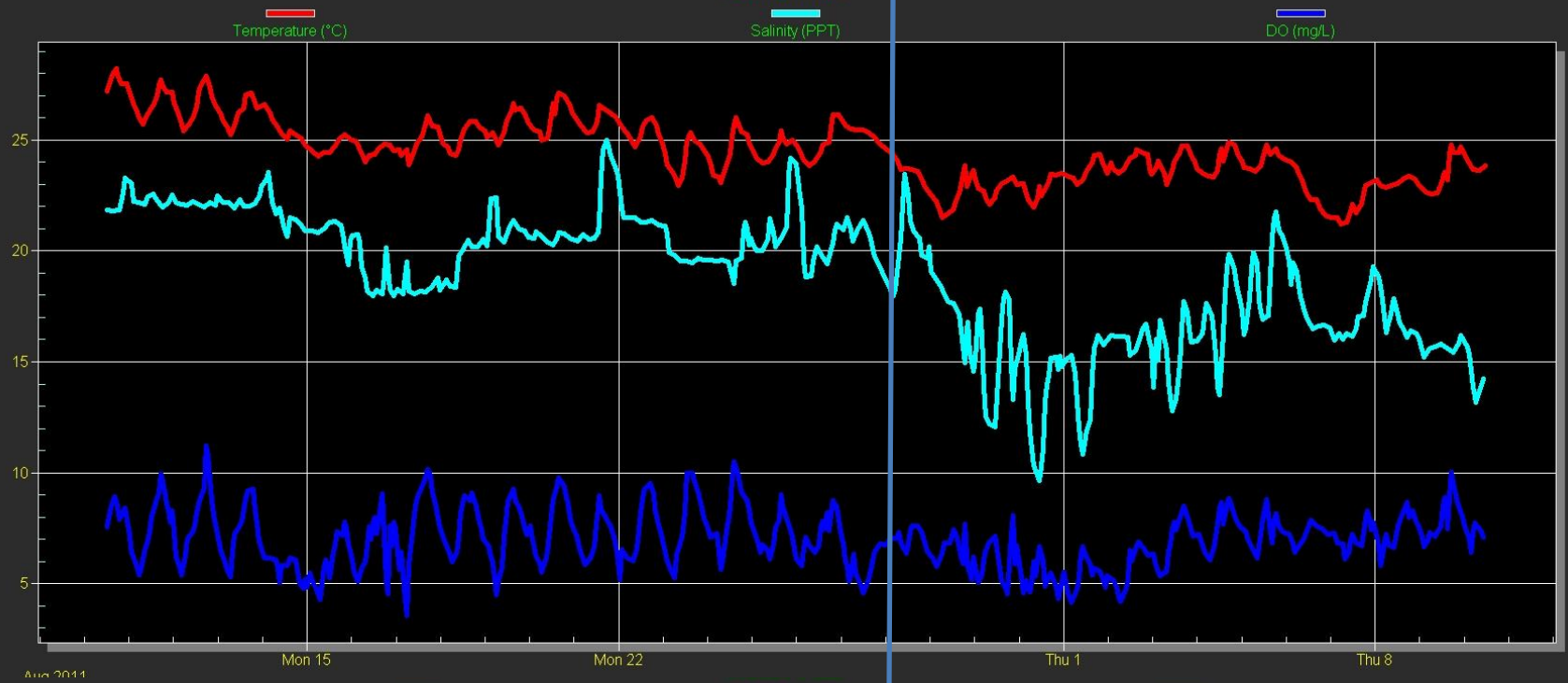


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Seaside Park



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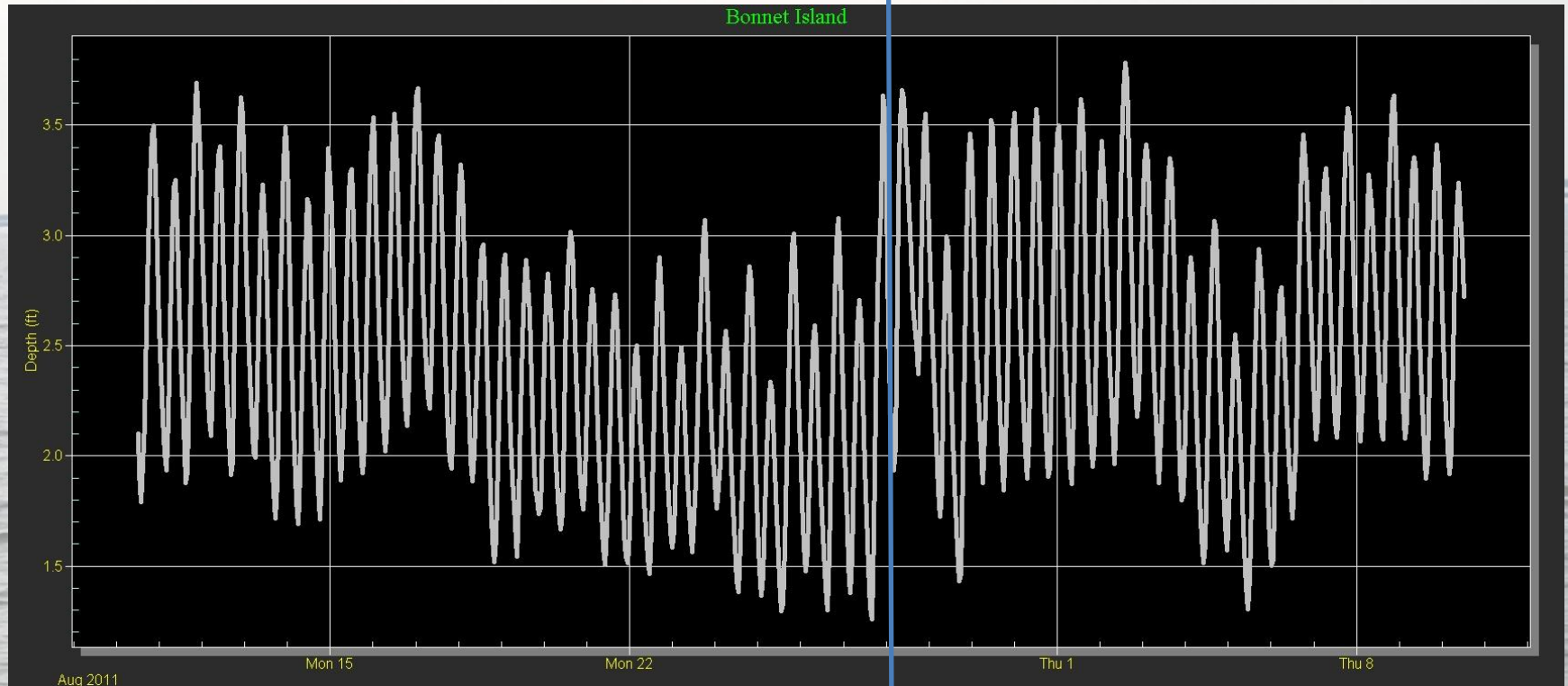
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Statistics Seaside park

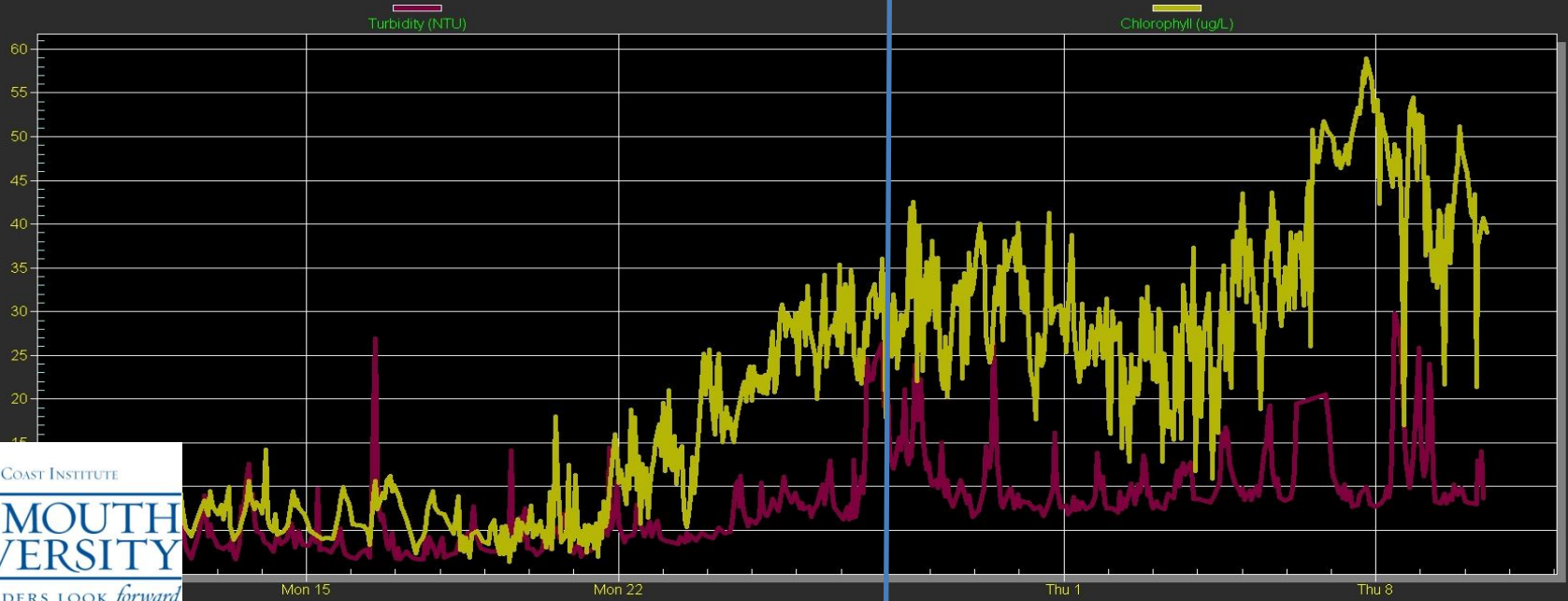
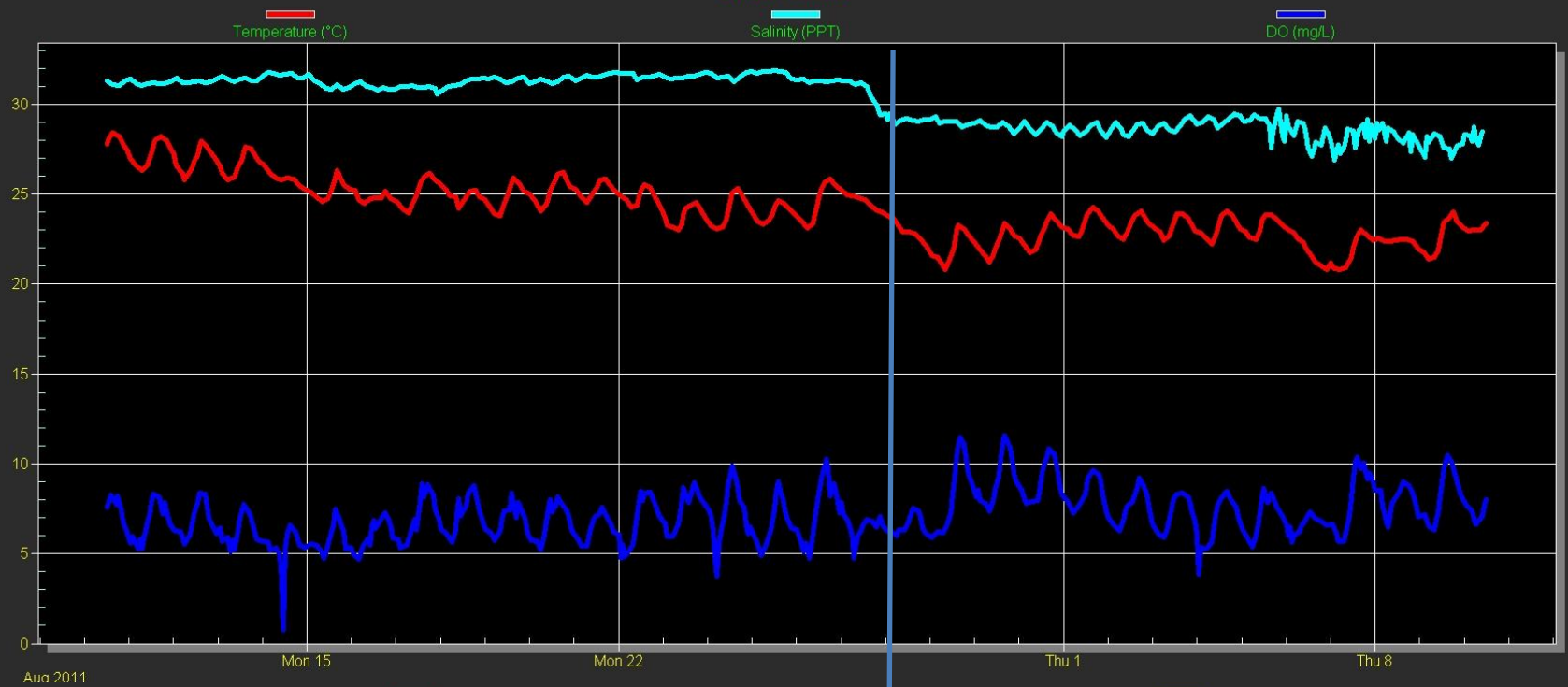
YSI SDI-12 Sonde 0	Mean	Minimum	Maximum	Avg Deviation	Std Deviation	Valid Samples	%
Temperature (°C)	24.50	21.17	28.21	1.15	1.42	737	25.01
Salinity (PPT)	18.89	9.65	24.99	2.40	2.87	737	25.01
Depth (ft)	5.247	4.144	6.582	0.320	0.401	737	25.01
pH (pH)	7.84	7.45	8.19	0.12	0.15	187	6.35
Turbidity (NTU)	5.61	1.40	26.28	2.38	3.51	736	24.97
Chlorophyll (ug/L)	23.3	5.1	56.2	6.4	8.5	727	24.67
DO (%)	93.9	52.6	161.7	15.2	19.1	737	25.01
DO (mg/L)	7.01	3.58	11.22	1.04	1.31	737	25.01

Bonnet Island



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Bonnet Island



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Statistics Bonnet Island

YSI SDI-12 Sonde 0	Mean	Minimum	Maximum	Avg Deviation	Std Deviation	Valid Samples	%
Temperature (°C)	24.15	20.79	28.47	1.35	1.65	745	25.03
Salinity (PPT)	30.15	26.92	31.88	1.33	1.41	745	25.03
Depth (ft)	2.475	1.260	3.782	0.492	0.584	745	25.03
pH (pH)	7.84	7.51	8.11	0.11	0.13	745	25.03
Turbidity (NTU)	7.44	1.65	29.80	3.34	4.58	723	24.29
Chlorophyll (ug/L)	21.3	1.4	58.9	12.6	14.6	745	25.03
DO (%)	101.3	11.5	161.6	15.9	19.5	745	25.03
DO (mg/L)	7.16	0.78	11.65	1.12	1.40	745	25.03

Conclusions

- Tropical Events and Nor'easters do show up in water quality records
- Noticeable spike in Turbidity values
- Loss of diurnal signal
- Variability between locations
- Coupled with Meteorological data will give a fuller picture will yield a much better picture

Thank You

Questions?

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